



UNIVERSITY EXAMINATIONS

SECOND SEMESTER 2023/2024 ACADEMIC YEAR

**THIRD YEAR EXAMINATION FOR THE DEGREE OF
BACHELOR OF SCIENCE (ICT)**

COMP 326: KNOWLEDGE BASED SYSTEMS

STREAM: R

TIME: 2 HRS

DAY: WEDNESDAY[2.30 – 4.30 P.M]

DATE: 17/04/2024

THIS QUESTION PAPER CONSISTS OF THREE (3) PAGES

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INSTRUCTIONS: ANSWER QUESTION ONE (COMPULSORY) AND ANY OTHER TWO QUESTIONS

QUESTION ONE (30 MARKS)

- a) Define the following terms as used in knowledge based systems
 (i) Knowledge -based system
 (ii) Knowledge
 (iii) Expert system
 (iv) Applied AI
 (v) Intelligence (5 Marks)
- b) Describe **FIVE** advantages of knowledge based systems over human experts (5 Marks)
- c) Using examples, give a brief history of knowledge based systems (4 Marks)
- d) Citing examples differentiate between procedural and declarative knowledge. (4 Marks)
- e) Explain **FOUR** key sources of knowledge in knowledge engineering (4 Marks)
- f) State **two** suitability factors of decision trees in knowledge representation as compared to decision tables. (4 Marks)
- g) Using a diagram, describe the general architecture of KBS. (4 Marks)

QUESTION TWO (20 MARKS)

- a) State **THREE** qualities possessed by a human expert (3 Marks)
- b) Outline any **FOUR** desirable features of an expert system (2 Marks)
- c) Describe **FOUR** reasons why expert systems are usually built (4 Marks)
- d) According to Prof. Morris Firebaugh, describe the kinds of problems that can easily be solved by expert systems (2 Marks)
- e) Explain how Artificial Intelligence (AI) differ from non-AI computer science (4 Marks)
- f) Describe the Turing test in words and a diagram (5 Marks)
- c) Given the following predicate logic statements: “All animals have hooves”.
 Write a prolog statement to represent a precise representation, and explain their meaning.



QUESTION THREE (20 MARKS)

- a) State four differences between conventional programs and expert systems. **(4 Marks)**
- b) Describe four fields of application where expert systems developments can be used. **(4 Marks)**
- c) State two advantages and two disadvantages that automatic rule induction methods have in learning process of knowledge refinement. **(4 Marks)**
- d) Use appropriate logic notations to represent the following statements:
 “Whenever he wears shirt that has short sleeves, then he ends up either staying indoors at her house or drinks warm water.”

Explain your notations.

- e) Explain the use of script-based method of knowledge representation. **(4 Marks)**

QUESTION FOUR (20 MARKS)

- a) Outline any four characteristics features of expert systems. **(4 Marks)**
- b) Explain the basic steps that can be followed during knowledge acquisition process. **(4 Marks)**
- c) Describe the theory of certainty factors (FCS), using evidence and belief. **(4 Marks)**
- d) Explain the major features of semantic networks method of knowledge representation and then state one advantage and one disadvantage of SNS. **(4 Marks)**
- e) Describe case based reasoning (CBR) method of inference mechanism **(4 Marks)**

QUESTION FIVE (20 MARKS)

- a) Compare and contrast forward and backward chaining **(6 Marks)**
- b) Distinguish between descriptive and procedural knowledge **(4 Marks)**
- c) Briefly explain the most appropriate knowledge elicitation techniques for extracting each of the following types of knowledge:
- (i) Procedural knowledge
- (ii) Tacit knowledge **(6 Marks)**
- d) Outline the systems analysis and design approach to developing knowledge based systems. **(4 Marks)**

